

Department of Computer Science  
CMPT 429.3  
Midterm Examination  
CLOSED BOOK

Marks

Time: 50 minutes

March 8, 2002

- (8) 1. Define precisely the following:
- a) reduced grammar
  - b) simple LL(1) grammar
  - c) simple phrase
  - d) nullable nonterminal
- (12) 2. a) What are ways of avoiding the design of a new language?  
b) From a programming language design viewpoint, give a very brief evaluation of a high-level language that you know well.
- (10) 3. Construct a deterministic finite automaton which accepts all strings of 0's and 1's having both an odd number of 0's and an odd number of 1's. A state diagram is sufficient!
- (10) 4. Obtain a grammar for the language which consists of the set of all strings containing more 0's than 1's.

- (10) 5. a) Find the FIRST and FOLLOW sets for the following grammar:

- |            |   |
|------------|---|
| 0.         | $S' \rightarrow S\#$                    |
| 1.         | $S \rightarrow ABC$                     |
| 2., 3., 4. | $A \rightarrow a \mid Cb \mid \epsilon$ |
| 5., 6., 7. | $B \rightarrow c \mid dA \mid \epsilon$ |
| 8., 9.     | $C \rightarrow e \mid f$                |

where  $V_N = \{A, B, C, S, S'\}$  and  $V_T = \{a, b, c, d, e, f\}$

- b) Determine whether or not the grammar in Part a) is LL(1). Show your work!